

REMARKS

Claims 1-17 were pending in the above-identified application when last examined and are amended as indicated above.

Claims 1 and 4-7 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Pat. No. 5,831,832 (Gillette). Applicants respectfully traverse.

Independent claim 1 distinguishes over Gillette at least by reciting, "a underfill material filling of a gap between the die and the substrate and extending from under the die onto the first face of the substrate, wherein the underfill material remains at a level below a second major surface of the die, and the dam confines and shapes the underfill material at an edge that overlies a portion of the ball grid array."

Gillette is directed to a device package that includes a boarder that acts as a dam for encapsulant. For example, Gillette beginning at column 3, line 59 states, "In practice, the border 40 also acts as a dam to contain the spread of an encapsulant 42 which is applied over the die 38 and associated wirebonds 54." Gillette is thus concerned with controlling the spread of encapsulant. However, Gillette fails to suggest use of a dam for underfill that fills "a gap between the die and the substrate and ... remains at a level below a second major surface of the die," as now recited in claim 1 because Gillette provides no indication that a dam needed or useful for underfill. In particular, Gillette fails to suggest that a dam is needed or desirable to control the spread of the small quantity of material used for underfill.

As described in Applicants' specification, the edge of thin layers of underfill can cause stress that warps the thin interconnect substrates used in some flip-chip packages. This warping at the edge of the underfill can make electrical connections of underlying BGAs undependable. Gillette fails to suggest this problem or Applicants' solution of shaping the edge of the underfill. Accordingly, claim 1 is patentable over Gillette.

Claims 4-7 depend from claim 1 and are patentable over Gillette for at least the same reasons that claim 1 is patentable over Gillette.

For the above reasons, Applicants request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102.

Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as unpatentable over Gillette in view of U.S. patent No. 5,936,310 (Wensel). Claim 3 is canceled. Applicants respectfully traverse the rejection of claim 2.

Claim 2 depends from claim 1, which is patentable over Gillette for at least the reasons given above. In particular, Gillette discloses a structure that controls the spread of encapsulant but fails to suggest shaping underfill. Wensel is similarly directed to control of glob top encapsulants. Accordingly, the combination of Gillette and Wensel fails to suggest "dam confines and shapes the underfill material at an edge that overlies a portion of the ball grid array" as recited in claim 1, and claim 2 is therefore patentable over the combination of Gillette and Wensel.

For the above reasons, Applicants request reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a).

Claims 8-12 were objected to as dependent upon a rejected claim but were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, claim 8 is amended to independent form including all of the original limitations of claim 1. Claims 9-12 depend from claim 8 and no longer depend from a rejected claim. In view of the above amendment of claim 8, Applicants request reconsideration and withdrawal of the objection to claims 8-12.

In summary, claims 1-17 were pending in the application. Claims 13-17 were allowed. This response amends claims 1, 2, 4, and 8 and cancels claim 3. For the above reasons, Applicants respectfully request allowance of the application including claims 1, 2, and 4-17.

Please contact the undersigned attorney at (408) 927-6700 if there are any questions concerning the application or this document.

EXPRESS MAIL LABEL NO:

ED 036 978 685 US

THE PATENT LAW OFFICES
OF DAVID MILLERS
6560 ASHFIELD COURT
SAN JOSE, CA 95120
PH: (408) 927-6700
FX: (408) 927-6701

Respectfully submitted,



David Millers
Reg. No. 37,396